FIG. 1

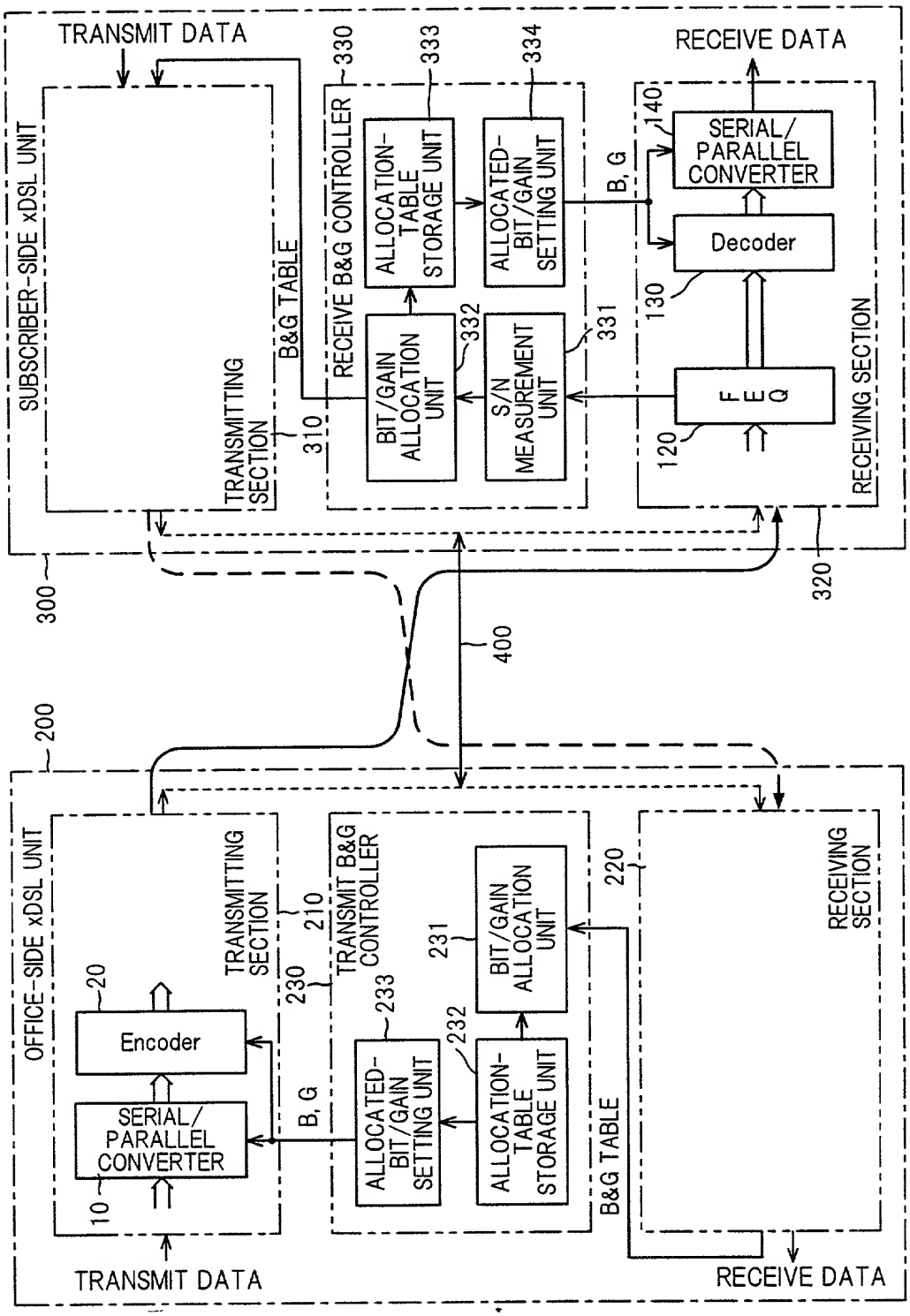
TRANSMIT DATA
RECEIVE DATA
SUBSCRIBER-SIDE xDSL UNIT
TRANSMITTING SECTION
B&G TABLE
RECEIVE B&G CONTROLLER
ALLOCATION-TABLE STORAGE UNIT
ALLOCATED-BIT/GAIN SETTING UNIT
BIT/GAIN ALLOCATION UNIT
S/N MEASUREMENT UNIT
SERIAL/PARALLEL CONVERTER
Decoder
F E Q
RECEIVING SECTION
B, G
310
330
331
332
333
334
120
130
140
300
320
400
200
OFFICE-SIDE xDSL UNIT
TRANSMITTING SECTION
Encoder
SERIAL/PARALLEL CONVERTER
TRANSMIT B&G CONTROLLER
ALLOCATED-BIT/GAIN SETTING UNIT
ALLOCATION-TABLE STORAGE UNIT
BIT/GAIN ALLOCATION UNIT
RECEIVING SECTION
B&G TABLE
10
20
210
220
230
231
232
233
TRANSMIT DATA
RECEIVE DATA

FIG. 2

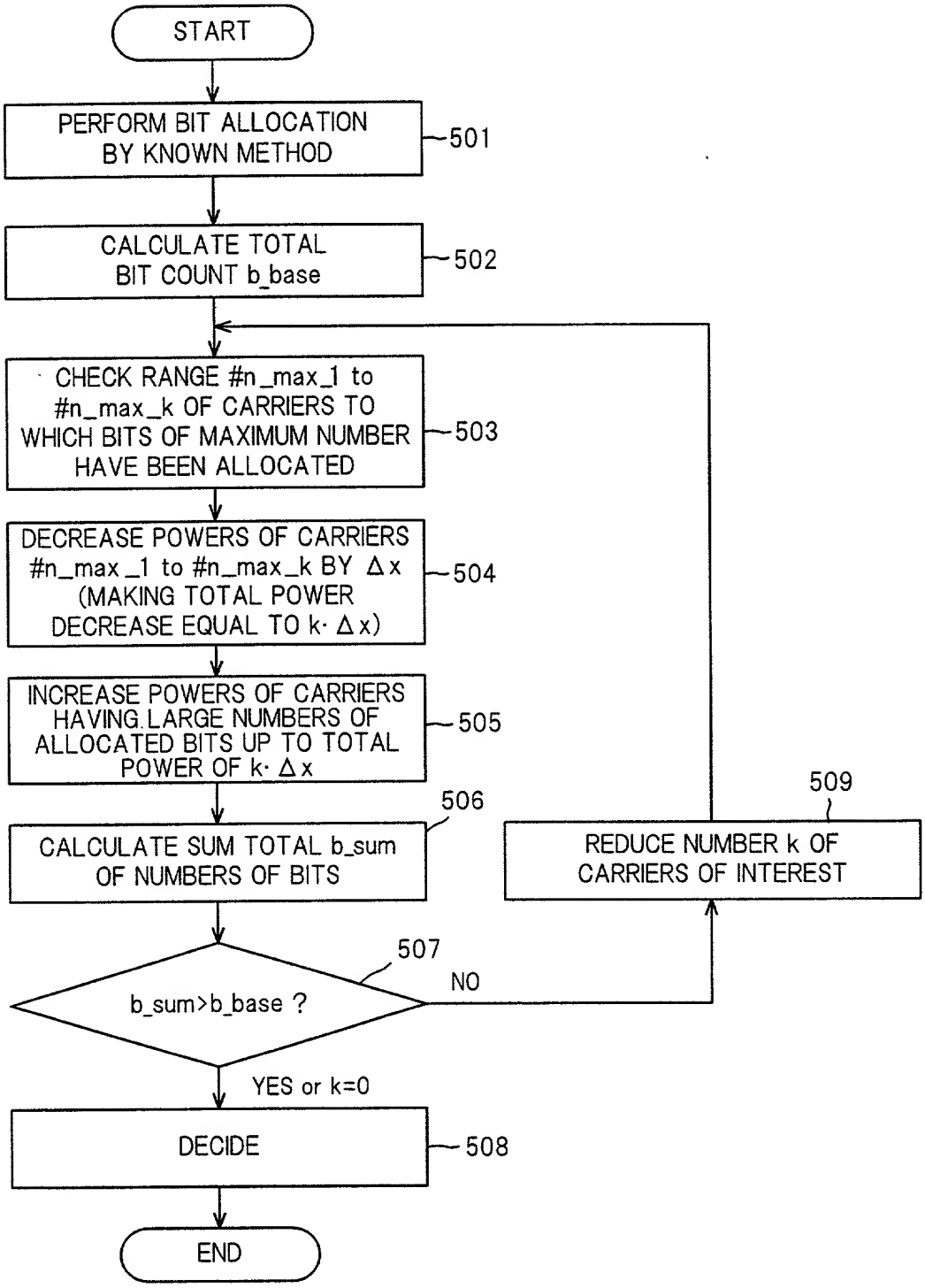
START
PERFORM BIT ALLOCATION BY KNOWN METHOD
501
CALCULATE TOTAL BIT COUNT b_base
502
CHECK RANGE #n_max_1 to #n_max_k OF CARRIERS TO WHICH BITS OF MAXIMUM NUMBER HAVE BEEN ALLOCATED
503
DECREASE POWERS OF CARRIERS #n_max_1 to #n_max_k BY Δx (MAKING TOTAL POWER DECREASE EQUAL TO k· Δx)
504
INCREASE POWERS OF CARRIERS HAVING LARGE NUMBERS OF ALLOCATED BITS UP TO TOTAL POWER OF k· Δx
505
CALCULATE SUM TOTAL b_sum OF NUMBERS OF BITS
506
b_sum>b_base ?
507
NO
REDUCE NUMBER k OF CARRIERS OF INTEREST
509
YES or k=0
DECIDE
508
END

FIG. 3

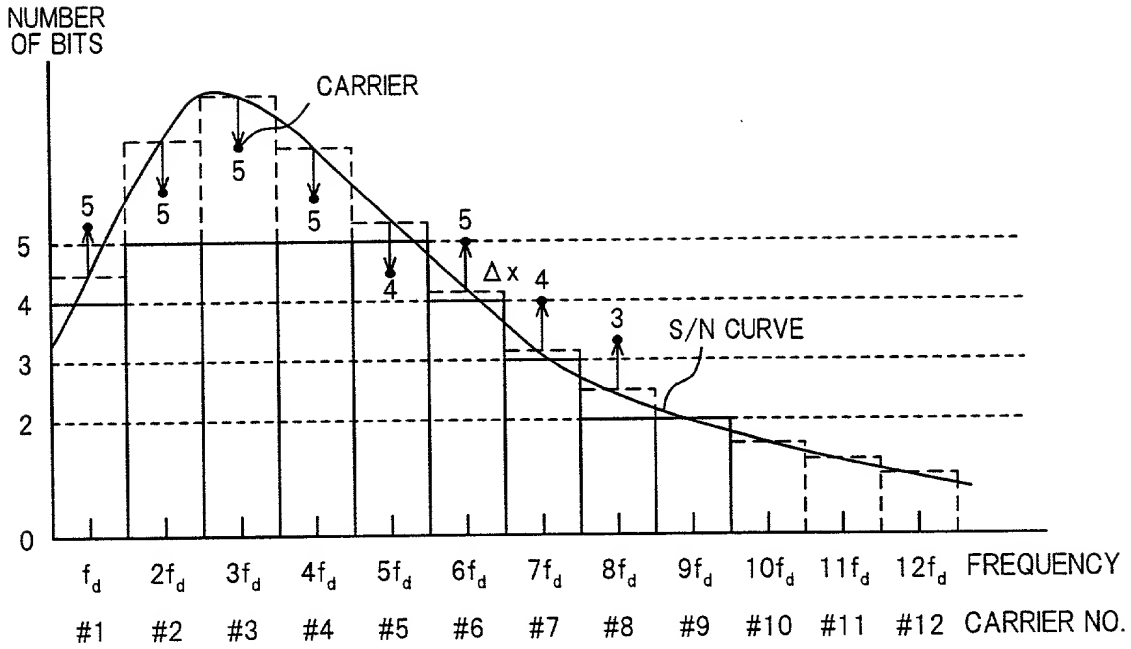

FIG. 4

NO.	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
BITS	5	5	5	5	4	5	4	3	2	0	0	0	38
ADDITIONAL GAIN	+Δx	−Δx	−Δx	−Δx	−Δx	+Δx	+Δx	+Δx	0	0	0	0	0

FIG. 5

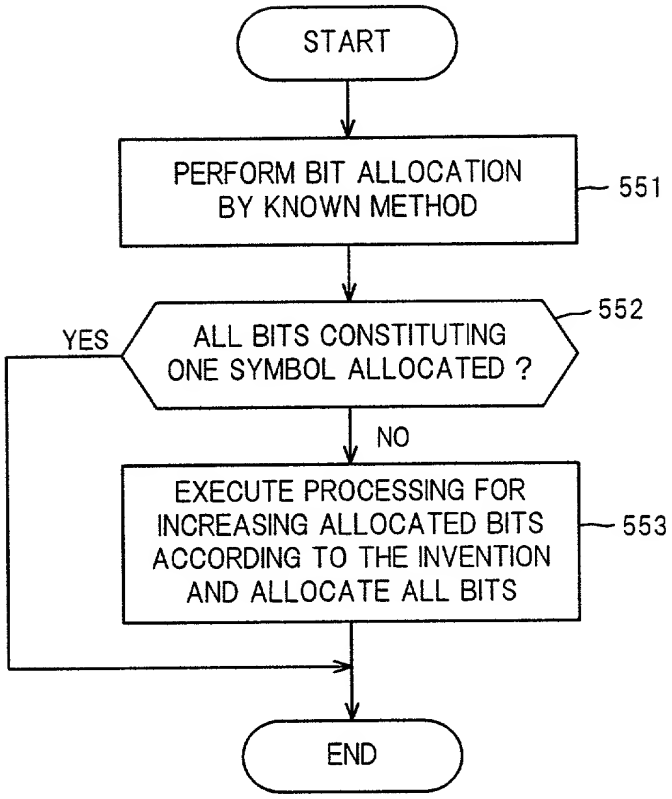
START
PERFORM BIT ALLOCATION BY KNOWN METHOD
551
ALL BITS CONSTITUTING ONE SYMBOL ALLOCATED ?
552
YES
NO
EXECUTE PROCESSING FOR INCREASING ALLOCATED BITS ACCORDING TO THE INVENTION AND ALLOCATE ALL BITS
553
END

FIG. 6

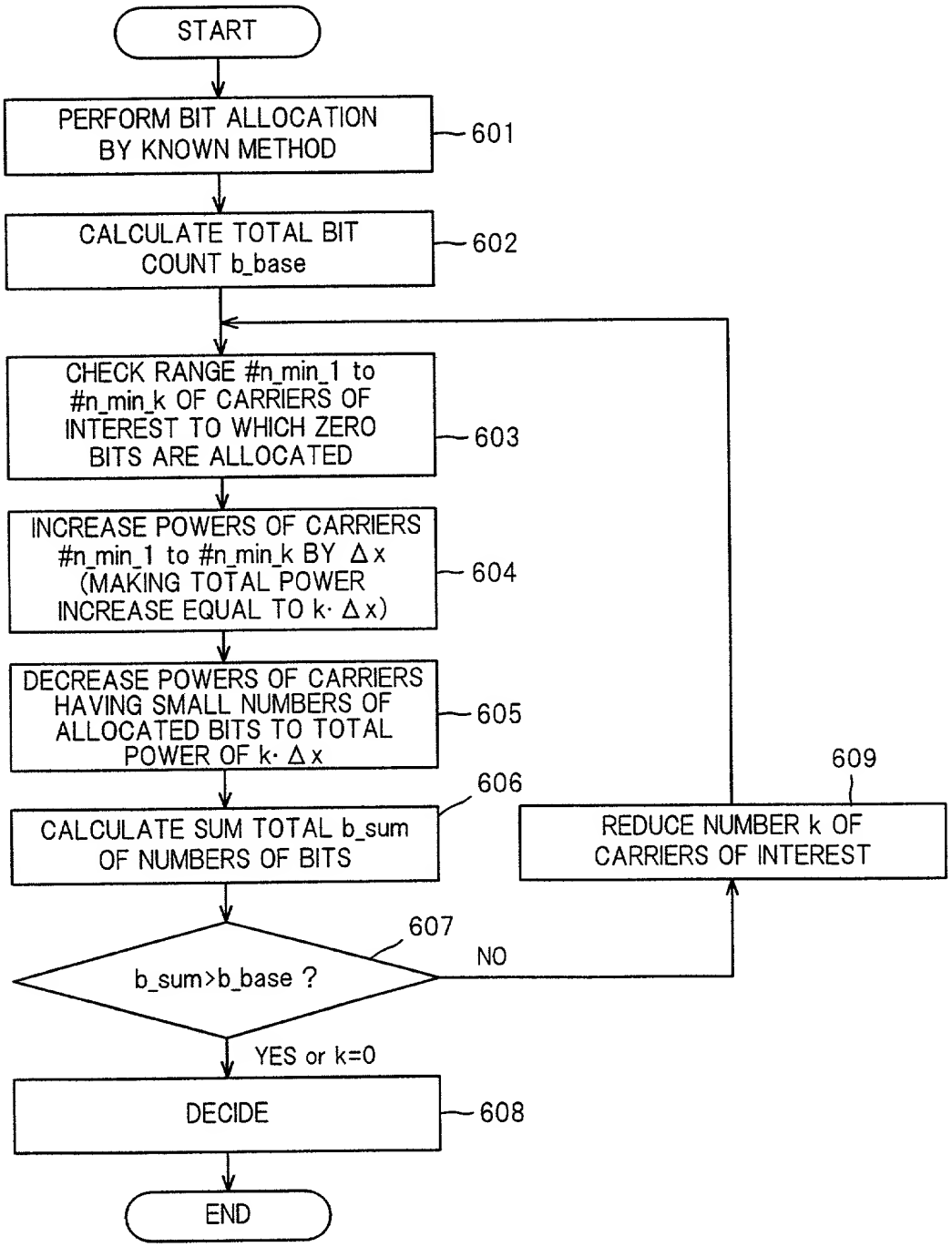
START
PERFORM BIT ALLOCATION BY KNOWN METHOD
601
CALCULATE TOTAL BIT COUNT b_base
602
CHECK RANGE #n_min_1 to #n_min_k OF CARRIERS OF INTEREST TO WHICH ZERO BITS ARE ALLOCATED
603
INCREASE POWERS OF CARRIERS #n_min_1 to #n_min_k BY Δx (MAKING TOTAL POWER INCREASE EQUAL TO k· Δx)
604
DECREASE POWERS OF CARRIERS HAVING SMALL NUMBERS OF ALLOCATED BITS TO TOTAL POWER OF k· Δx
605
CALCULATE SUM TOTAL b_sum OF NUMBERS OF BITS
606
b_sum>b_base ?
607
NO
REDUCE NUMBER k OF CARRIERS OF INTEREST
609
YES or k=0
DECIDE
608
END

FIG. 7

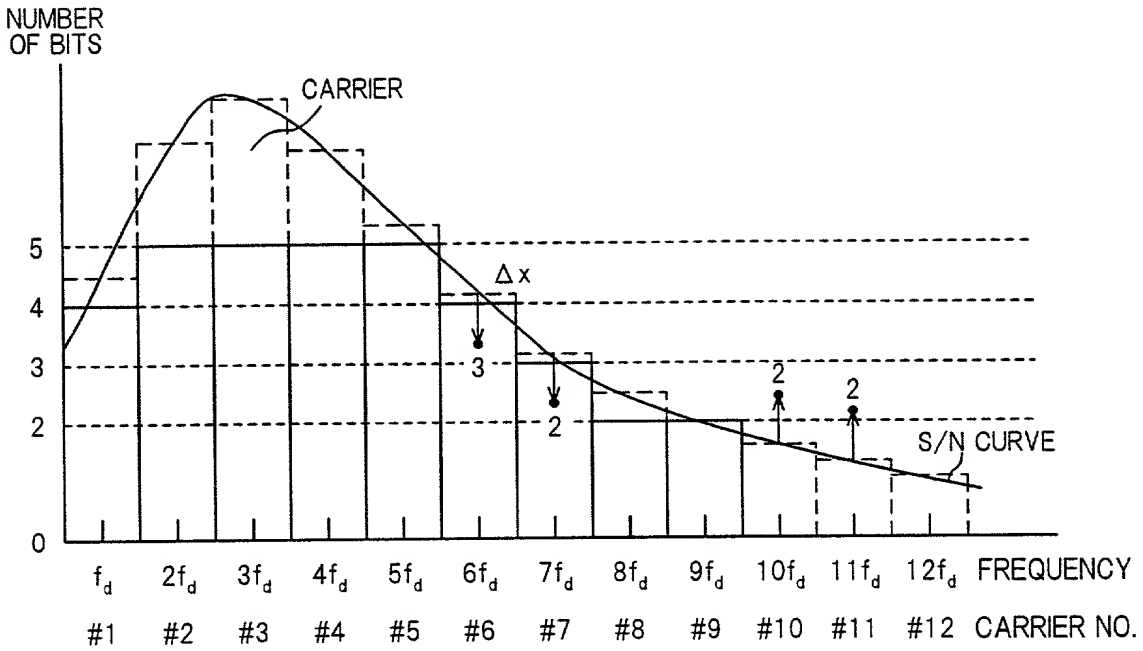

FIG. 8

NO.	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
BITS	4	5	5	5	5	3	2	2	2	2	2	0	37
ADDITIONAL GAIN	0	0	0	0	0	$-\Delta x$	$-\Delta x$	0	0	$+\Delta x$	$+\Delta x$	0	0

FIG. 9

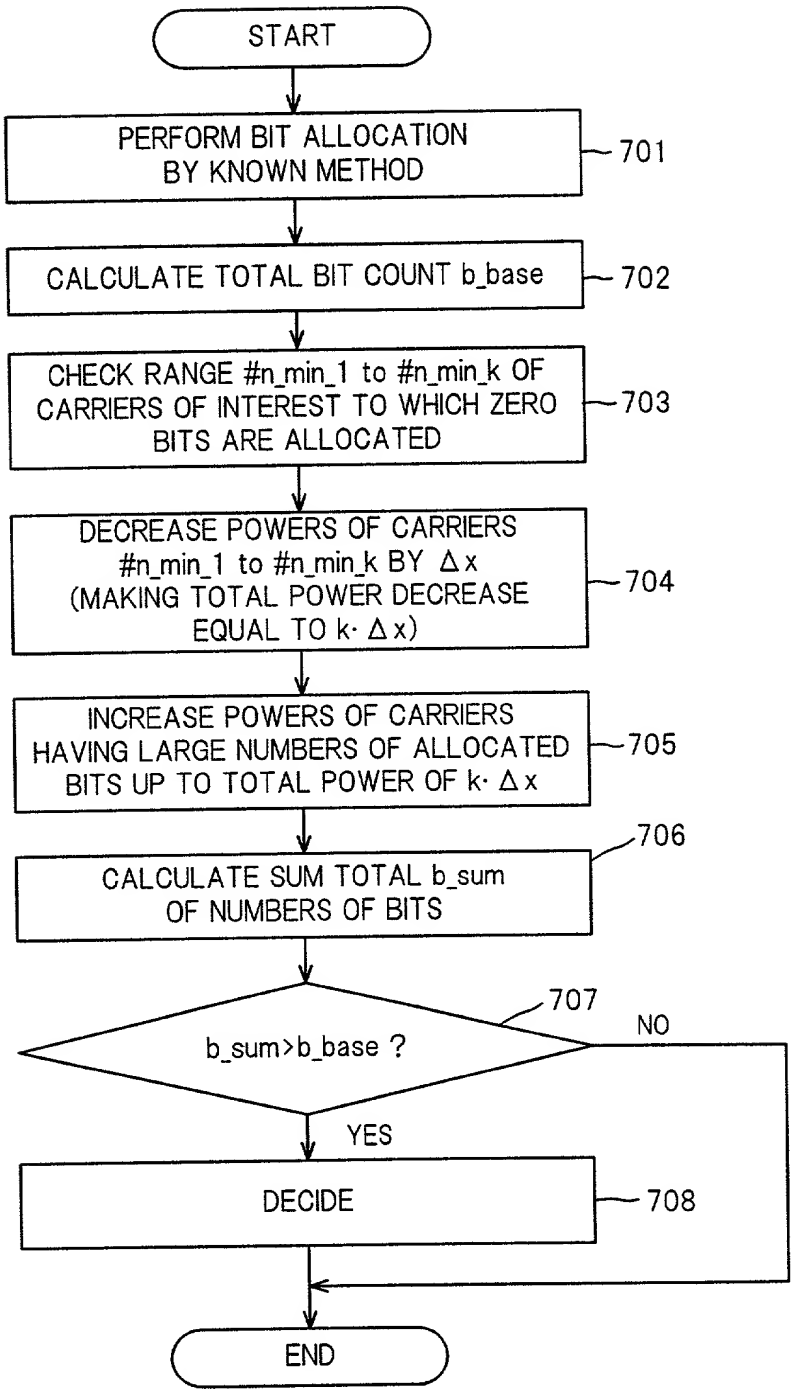
START
PERFORM BIT ALLOCATION BY KNOWN METHOD
701
CALCULATE TOTAL BIT COUNT b_base
702
CHECK RANGE #n_min_1 to #n_min_k OF CARRIERS OF INTEREST TO WHICH ZERO BITS ARE ALLOCATED
703
DECREASE POWERS OF CARRIERS #n_min_1 to #n_min_k BY Δx (MAKING TOTAL POWER DECREASE EQUAL TO k· Δx)
704
INCREASE POWERS OF CARRIERS HAVING LARGE NUMBERS OF ALLOCATED BITS UP TO TOTAL POWER OF k· Δx
705
CALCULATE SUM TOTAL b_sum OF NUMBERS OF BITS
706
b_sum>b_base ?
707
NO
YES
DECIDE
708
END

FIG. 10

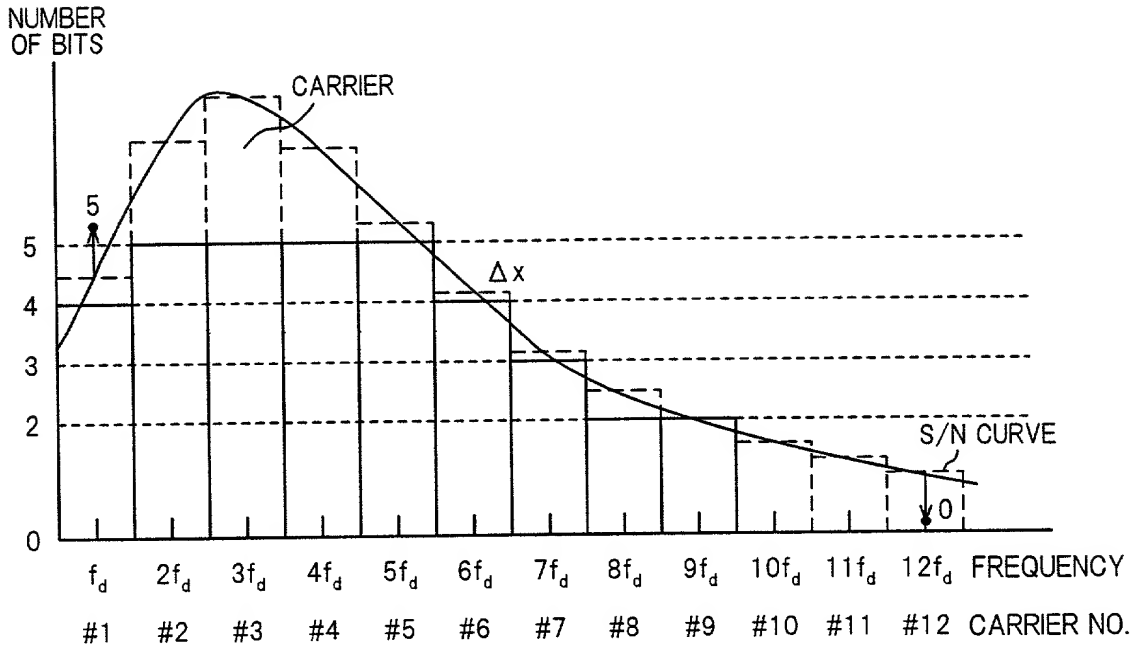

FIG. 11

NO.	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
BITS	5	5	5	5	5	4	3	2	2	0	0	0	36
ADDITIONAL GAIN	+Δx	0	0	0	0	0	0	0	0	0	0	−Δx	0

FIG. 12 PRIOR ART

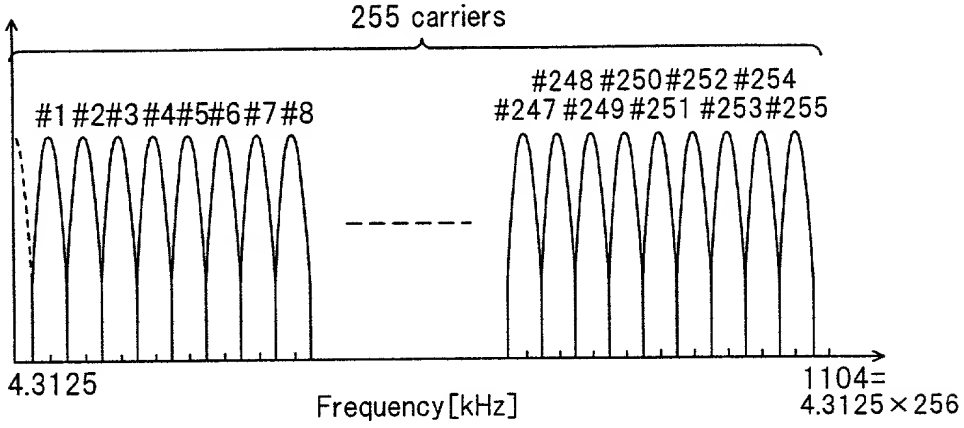

FIG. 13 PRIOR ART

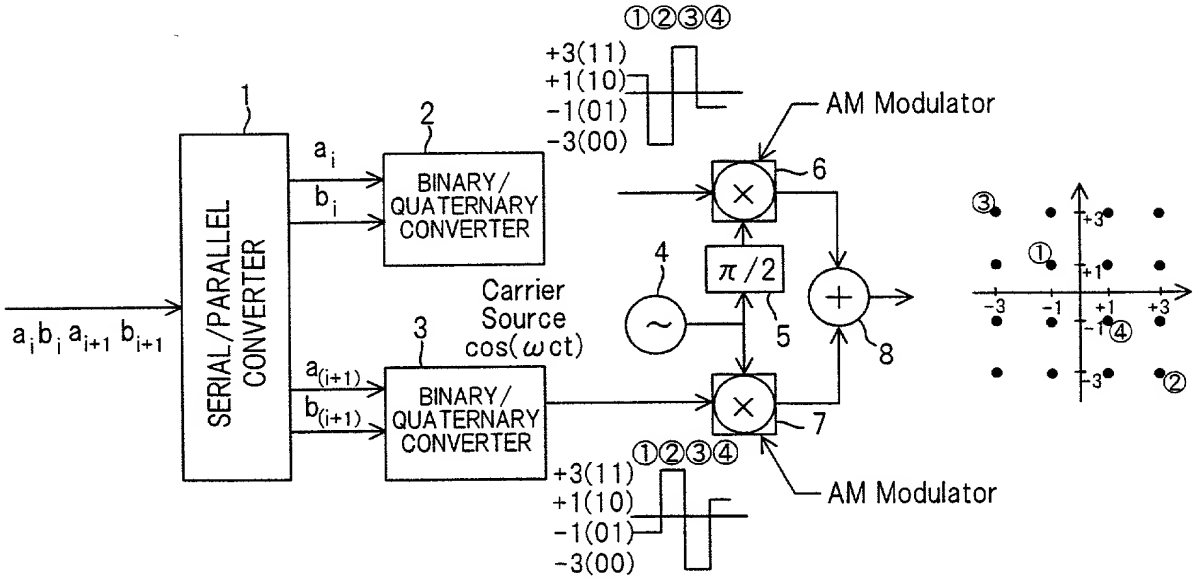

FIG. 14 PRIOR ART

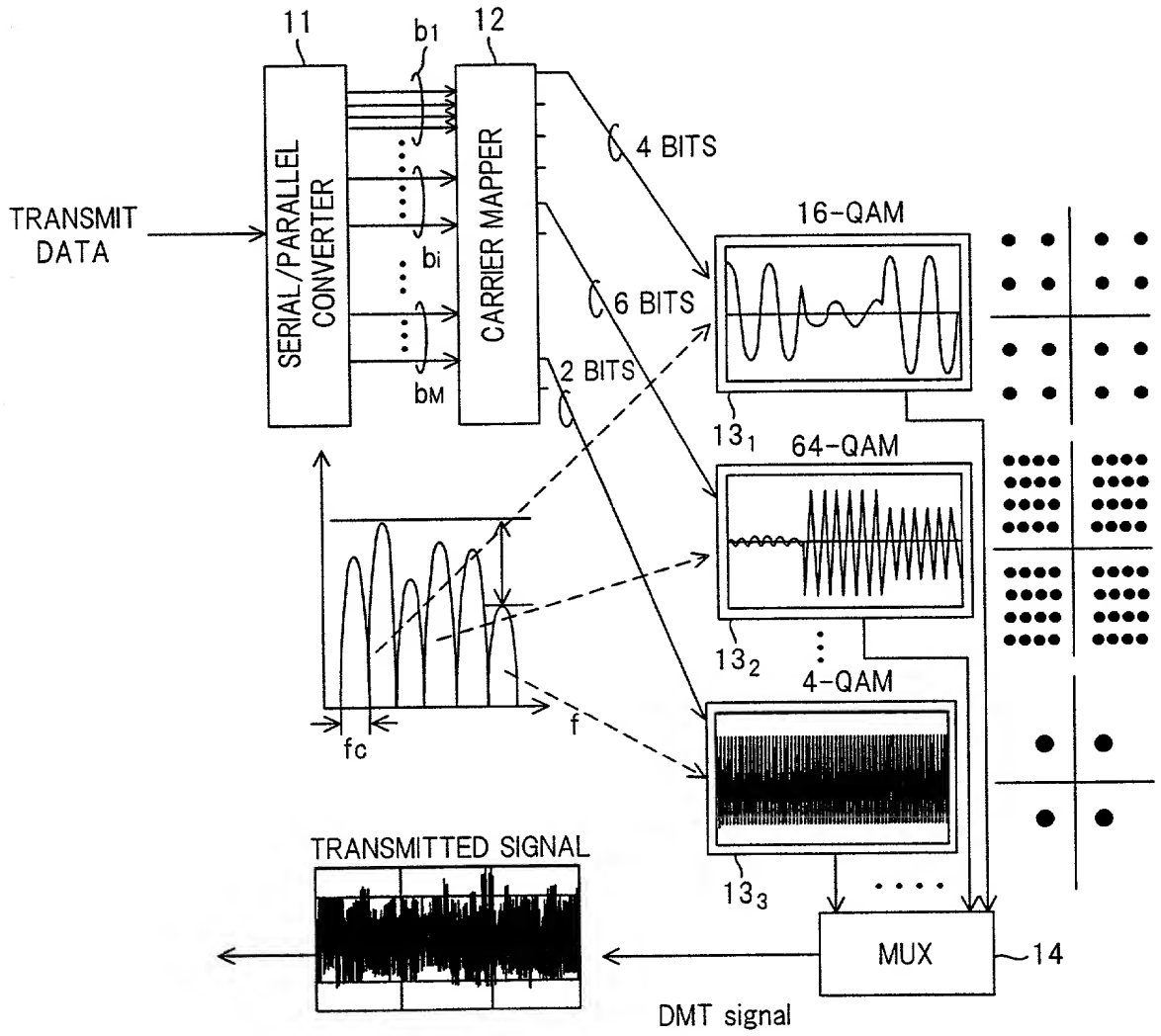

FIG. 16 PRIOR ART

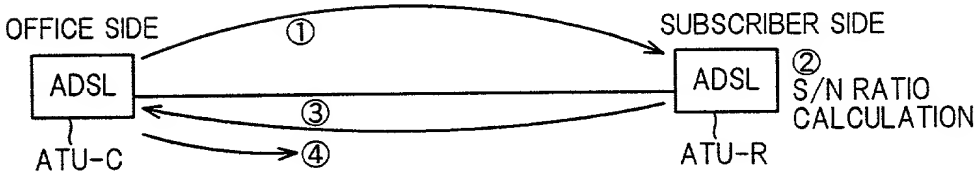

FIG. 15 PRIOR ART

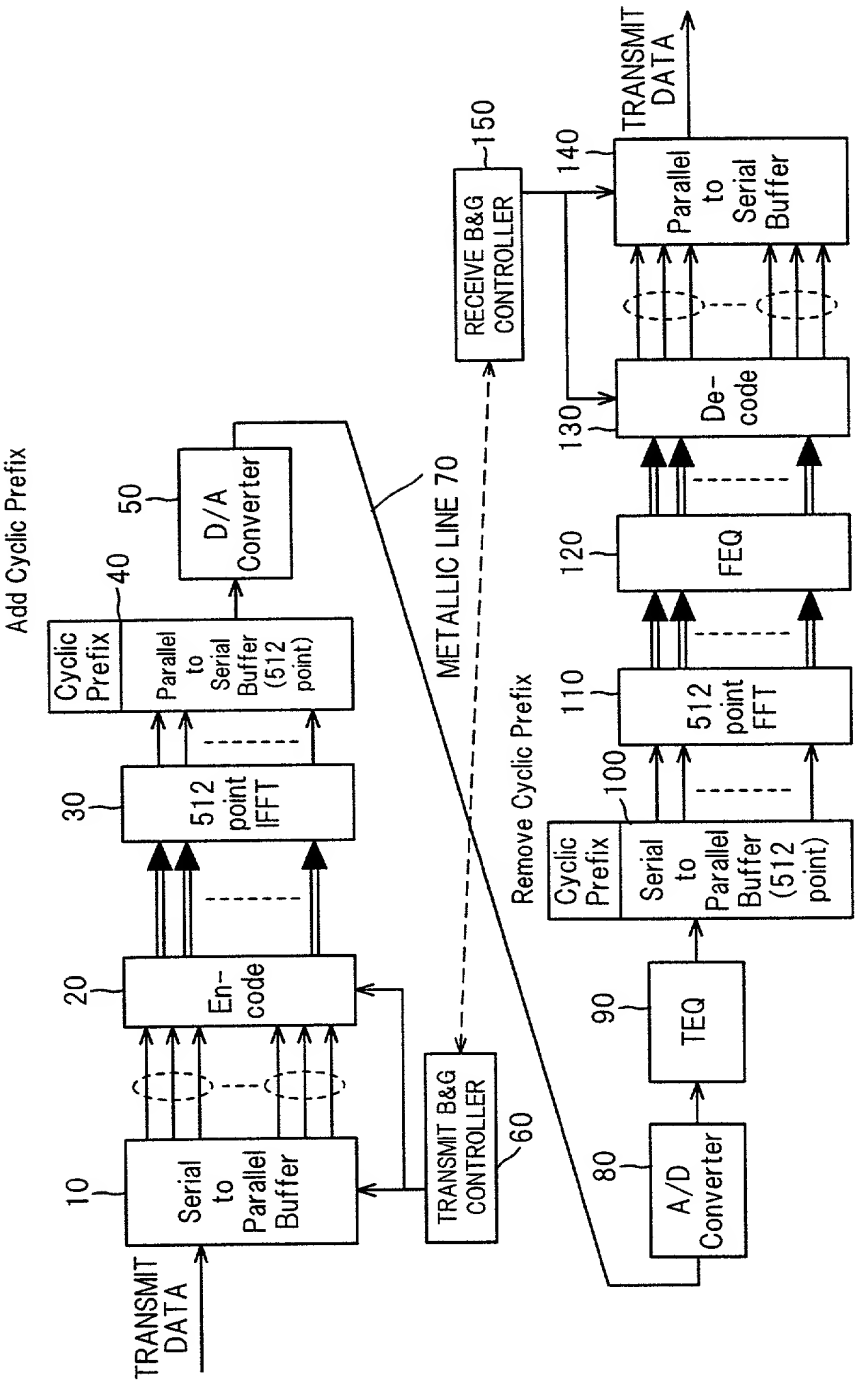

FIG. 17 PRIOR ART

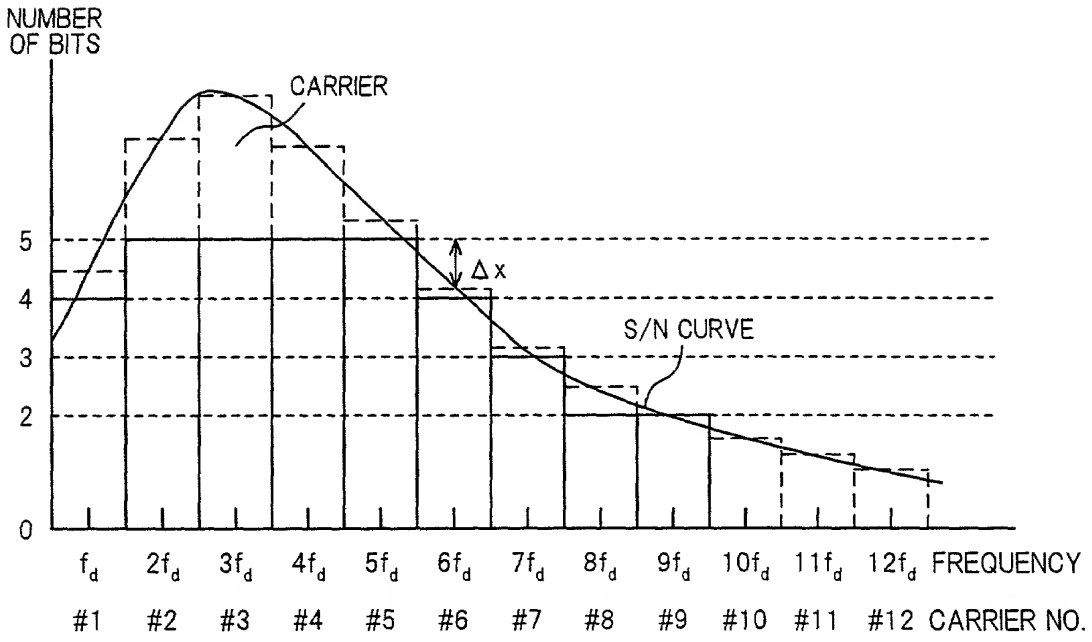

FIG. 18 PRIOR ART

NUMBERS OF BITS ALLOCATED BY BIT ALLOCATION BASED UPON KNOWN METHOD

CARRIER NO.	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
BITS	4	5	5	5	5	4	3	2	2	0	0	0	35